

# Bank of England

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**Yuliya Baranova, Eleanor Holbrook, David MacDonald, William Rawstone,  
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## The potential impact of broader central clearing on dealer balance sheet capacity: a case study of UK gilt and gilt repo markets

Yuliya Baranova,<sup>(1)</sup> Eleanor Holbrook,<sup>(2)</sup> David MacDonald,<sup>(3)</sup>  
William Rawstorne,<sup>(4)</sup> Nicholas Vause<sup>(5)</sup> and Georgia Waddington<sup>(6)</sup>

### Abstract

More widespread central clearing could enhance dealers' ability to intermediate financial markets by increasing the netting of buy and sell trades, thereby reducing the impact of trading on balance sheets and capital ratios. Drawing on trade-level regulatory data, we study the netting benefits for UK dealers if comprehensive central clearing had been introduced to the cash gilt and gilt repo markets ahead of the March 2020 dash for cash (DFC) crisis. For the gilt repo market, we estimate that the policy would have reduced the gilt repo exposures on UK dealers' balance sheets by 40% and, hence, boosted their aggregate leverage ratio by 3 basis points. If that policy had been accompanied by standardisation of repo maturity dates, such that they fell on the same day of the week (apart from for overnight repo), the reduction in exposures would have risen to 60% and the increase in the aggregate leverage ratio to 5 basis points. Such improvements in netting rates would in principle have allowed the dealers' repo desks to expand their trading during the DFC by 2.5 times more than under prevailing clearing rates for each incremental unit of capital available to them. For cash gilt trades, central clearing would only have reduced unsettled trade exposures for dealers using a particular accounting treatment, but would have done so by up to 80% for that group, boosting its aggregate leverage ratio by 0.4 basis points. However, changes to the computation of the Basel III leverage ratio implemented in January 2023 would also have had these effects on cash trades.

**Key words:** Central clearing, dealers, gilts, market structure, repo.

**JEL classification:** G12, G18, G23, G28.

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- (1) Bank of England. Email: [yuliya.baranova@bankofengland.co.uk](mailto:yuliya.baranova@bankofengland.co.uk)
- (2) Bank of England. Email: [eleanor.holbrook@bankofengland.co.uk](mailto:eleanor.holbrook@bankofengland.co.uk)
- (3) Bank of England. Email: [david.macdonald@bankofengland.co.uk](mailto:david.macdonald@bankofengland.co.uk)
- (4) Bank of England. Email: [william.rawstorne@bankofengland.co.uk](mailto:william.rawstorne@bankofengland.co.uk)
- (5) Bank of England. Email: [nicholas.vause@bankofengland.co.uk](mailto:nicholas.vause@bankofengland.co.uk) (corresponding author)
- (6) Bank of England. Email: [georgia.waddington@bankofengland.co.uk](mailto:georgia.waddington@bankofengland.co.uk)

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Bank of England, Threadneedle Street, London, EC2R 8AH

Email: [enquiries@bankofengland.co.uk](mailto:enquiries@bankofengland.co.uk)

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## Section 1: Introduction

Recent years have seen multiple episodes of dysfunction in core financial markets. Instances where demand for liquidity overwhelms the capacity of markets to absorb it, resulting in sharp and amplified moves in prices, have become more frequent. Some episodes have been confined to certain markets and jurisdictions, while others have spanned across borders and asset classes.

For example, in September 2019 the unsecured and secured funding rates in US money markets spiked up, as the reduction in the level of reserves in the US financial system interacted with intermediation constraints, which prevented their efficient re-allocation across the system (Afonso et al, 2020). In response, the NY Fed announced overnight repo operations to alleviate the pressures in US money markets.

Then, in March 2020, the outbreak of the COVID-19 pandemic exposed vulnerabilities in the global financial system, triggering dysfunction across global financial markets. An initial 'flight to safety', was followed by an abrupt and extreme 'dash for cash' (DFC), as manifested in forced selling pressure even in the most-liquid markets, such as those for US and UK government bonds, and a rapid increase in the demand for repo borrowing. This DFC was amplified by large margin calls on derivative users; asset sales by hedge funds and other leveraged investors seeking to reduce their risk exposures; and liquidity mismatches and the resulting incentives to redeem ahead of other investors in money market and other open-ended investment funds.

At the same time, liquidity supply was constrained globally by the willingness and/or ability of securities dealers and other intermediaries, such as principal trading firms, to expand their intermediation activity and, in doing so, take additional assets onto their balance sheets, resulting in severe dysfunction in core funding markets, including those for UK and US government bonds and related repo transactions (**Table 1**). Updated results based on Noss and Patel (2019) suggest that around one-third of the large increase in term gilt reverse repo spreads over March 2020 was driven by dealer supply constraints, with the remainder of the increase driven by unprecedented liquidity demand.

As this dysfunction in financial markets threatened to harm the broader economy, a number of central banks stepped in to supply additional liquidity, with the Bank of England, European Central Bank and Federal Reserve collectively expanding their asset-purchase programmes by over \$1.5 trillion in March 2020. They also activated additional repo facilities.

And, the vulnerabilities associated with leverage and margin calls, alongside limited willingness of dealers to provide liquidity, were highlighted again in September-October 2022 in the United Kingdom, as liability-driven investment (LDI) funds came under stress due to sharp increases in gilt yields, forcing them to raise liquidity and sell gilts. This caused dysfunction in long-dated gilt markets, which, if left unchecked, would have represented a material risk to UK financial stability. In response, the Financial Policy Committee recommended that action be taken and Bank of England carried out temporary purchases of long-dated UK government bonds on financial stability grounds (Breden, 2022; Hauser, 2023).

**Table 1: Measures of deterioration of government bond market liquidity during March 2020**

Liquidity measure	UK Gilts	US Treasuries
<i>Securities markets:</i>		
Bid-offer spreads <sup>1</sup>	Roughly quadrupled	Increased more than 10x
Price impact of trades <sup>2</sup>	n.a.	Increased more than 5x
Difference between bond yields and a fitted yield curve <sup>3</sup>	Roughly doubled	Roughly quadrupled
Ten-year bond loss of value (during peak liquidity deterioration) <sup>4</sup>	-6%	-10%
<i>Repo markets:</i>		
Overnight reverse repo spread to policy rate	Widened by 20bp	Widened by 30bp
Three-month reverse repo spread over OIS rate	Widened by 50bp	Widened by 50bp

Sources: Bank of England (2020), Duffie (2020), Hauser (2020), Logan (2020) and Bank calculations.

<sup>1</sup> Difference between the price at which the security can be sold by a client (the bid) and the price it can be purchased (the offer).

<sup>2</sup> Average change in price per unit of net order flow (buyer-initiated trade volume less seller-initiated trade volume) in the past minute.

<sup>3</sup> Hu-Pan-Wang (2013) 'noise measure' that summarises the differences between bonds yields and a fitted yield curve. The more liquid is a market, the cheaper it is for market participants to trade against such apparent arbitrage opportunities, thereby reducing them.

<sup>4</sup> Loss of value calculated as change in yield multiplied by modified duration.

The stress episodes described above have many similarities. This reflects the fact that many of the vulnerabilities that crystallised during those episodes are long-standing and have been growing in scale for some time. They developed in the years following the 2007-08 Global Financial Crisis (GFC), and largely reflect the relative growth of different parts of the non-bank financial system. On the one hand, investment vehicles whose demand for liquidity can surge as a result of liquidity mismatches or leverage have grown significantly. For instance, the assets of fixed-income open-ended funds and other collective investment vehicles susceptible to runs have more than tripled between end-2008 and end-2021 (FSB, 2022). During the same period, the assets of hedge funds increased by almost the same proportion (Statista, 2022), with the leverage available to them soon recovering to around pre-GFC levels following an initial decline. In addition, the exchange of margin against derivative exposures has become much more-widespread, and whilst this has been instrumental in reducing the counterparty credit risks in the derivatives market, it has resulted in larger margin calls on derivative users and hence larger liquidity risk in the system when markets are volatile. On the other hand, the assets warehoused by securities dealers have hardly grown during the 2008-2020 period, whilst the underlying government bond markets have grown much faster (Duffie, 2020; Bank of England 2021).

Policymakers around the world have been working in three areas to reduce this vulnerability of the non-bank financial system to liquidity imbalances (FSB 2022; Bank of England 2021; BIS 2022). Work in the first area aims to increase the resilience of non-banks to future liquidity shocks by dampening surges in the liquidity demand of certain institutions. This includes addressing liquidity mismatches and high levels of leverage in certain investment funds and boosting their ability to effectively respond to such shocks, such as through better preparedness to manage margin calls on their derivatives positions. The second aims to enhance market intermediation capacity, both by considering ways to enhance dealers' capacity to intermediate in a way that does not reduce their resilience, as well as exploring resilience-enhancing changes to market structure. More widespread use of central clearing,

which this paper will consider, falls into this second area. Finally, the third aims to improve the design of central bank tools to address market dysfunction, potentially making them available to a broader range market participants, but with a need to ensure they remain backstops and do not encourage additional risk taking.

This paper considers the merits of increasing the share of centrally cleared transactions in enhancing the intermediation capacity of securities dealers, especially in times of stress. Clearing encapsulates all the processes leading up to the settlement of a trade following a buyer and seller's initial commitment to it. *Central* clearing introduces a central counterparty (CCP) between the two original counterparties to a transaction, such that the CCP becomes the seller to the original buyer and the buyer to the original seller. As such, the CCP takes on the respective financial obligations of those original counterparties, such as making margin payments. Given the high resilience standards required of CCPs, this reduces the counterparty and settlement risk for market participants. Central clearing also facilitates the netting of transactions, which can occur when transactions are due to be settled on the same date and with a common counterparty. This netting process helps dealers to intermediate larger volumes of purchases and sales whilst mitigating the additional risk exposure on their balance sheets. This in turn reduces the additional amount of capital they need to hold under leverage ratio requirements.

In our study, we focus on UK government (gilt) bond markets, including both outright security transactions and sale-and-repurchase (repo) agreements. Many sterling investors rely on the liquidity of developed-economy government bonds and related repo markets for trading or liquidity and collateral management. Hence, it is particularly important to ensure that such 'core' markets are resilient.

The idea that more-widespread central clearing in government bond markets could enhance dealer intermediation was first proposed by Duffie (2020), who suggested a quantitative study to assess the potential benefits. That has been supported by policy makers, market practitioners and academics (IAWG, 2021; IAWG 2022; Group of Thirty, 2021; TFFS, 2021). Fleming and Keane (2021) have provided a first quantitative assessment of the potential netting benefits for dealers in the US Treasury market. They found that central clearing of all outright cash UST trades would have reduced the daily gross settlement obligations of dealers by roughly \$330 billion (60 percent) on average in January-April 2020, rising to almost \$800 billion (70 percent) on days of market stress, when trading was at its highest. Such reductions in settlement obligations do not necessarily imply a material expansion in dealer intermediation capacity, however, which will come on to discuss in Section 3. Similarly, Chen et al (2022) have provided a first study of the potential netting benefits of central clearing in Canadian repo markets. Focusing on the fixed-income repo market, they found that expanding CCP membership from the status quo (mainly securities dealers) to all market participants could have increased the proportion of repos that were netted from 34% to 58% on average. During March 2020, it could have increased the proportion from 40% to 70%.

Further, analysis of the behaviour of participants in the gilt and gilt repo market during the March 2020 stress suggests that cleared gilt repo activity might have been more resilient than non-cleared activity during this stress episode. Specifically, Hüser et al (2021) found a significant increase in volumes traded in the cleared segment of the market during the March 2020 stress, while volumes in the non-cleared segment contracted. In addition, while in normal times, contacts often report cleared repo can be more expensive due to the risk management requirements associated with central

clearing, there was evidence in March 2020 of dealers charging materially lower rates on less-capital intensive “nettable” term gilt repo transactions (which are more often cleared trades) relative to “non-nettable” transactions (BCBS 2021).<sup>5</sup>

In September 2022, the Securities and Exchange Commission (SEC) proposed rule changes in the United States to mandate and facilitate additional clearing of eligible US Treasury (UST) securities and related repo transactions (SEC 2022). This comes as part of a suite of reforms the US authorities are considering to increase the resilience of UST markets. And, in an international context, the Financial Stability Board recommended jurisdictions to explore ways to increase the availability and use of central clearing in government bond cash and repo markets to enhance market resilience (FSB, 2022).

In this paper, we provide a first study for the gilt market, which explores the impact of greater central clearing of cash gilt trades on the size of dealers’ balance sheets, their regulatory capital ratios and, hence, ability to intermediate markets. We also present a similar study for the gilt repo market. Repos often have longer settlement horizons than outright sales and purchases, which generates more settlement risk and greater balance sheet exposures. Greater use of central clearing could help net down that exposure. Thus, this work contributes to the policy debate on market structure reforms that could enhance the resilience of liquidity provision during times of stress, and which could complement other reforms aimed at reducing potential liquidity demands.

While our quantitative analysis focuses on the extent to which more widespread central clearing could support dealer intermediation, we also consider other benefits and potential risks qualitatively. Other potential benefits include a reduction in settlement fails and the creation of incentives for greater adoption of all-to-all trading, which – other things equal – could enhance market liquidity by allowing a more-diverse range of market participants to interact directly without intermediaries. But there are potential costs too. These include the increased risk to be borne by CCPs – especially if they were to clear for new, riskier client types. In addition, there may be additional liquidity needs in stress for market participants arising from centrally cleared margin requirements.<sup>6</sup> A more comprehensive assessment of these costs and benefits is required to determine whether more widespread central clearing in UK government bond markets is a net positive for the resilience of the UK financial system more broadly.

The paper proceeds as follows. Section 2 provides some background on central clearing, including how it works and its prevalence in gilt and gilt repo markets. Sections 3 and 4 then present our quantitative analyses of the netting benefits for dealers of more-widespread central clearing in the gilt and gilt-repo markets respectively. Section 5 follows with our qualitative analysis of other benefits and costs of expanded central clearing. As this depends on the approach to expansion, this section includes a high-level discussion of the pros and cons of different ways in which non-dealers could access central clearing. Section 6 concludes.

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<sup>5</sup> See Section 4.2 of Bank of England (2021) for more detail. Within BCBS (2021), see Table 11 in particular. For the purpose of this paper, a dealer’s repo (or reverse repo) transactions are “nettable” if it can offset their value against reverse repo (or repo) transactions with the same counterparty, such that only the net amount is recorded as a balance-sheet exposure.

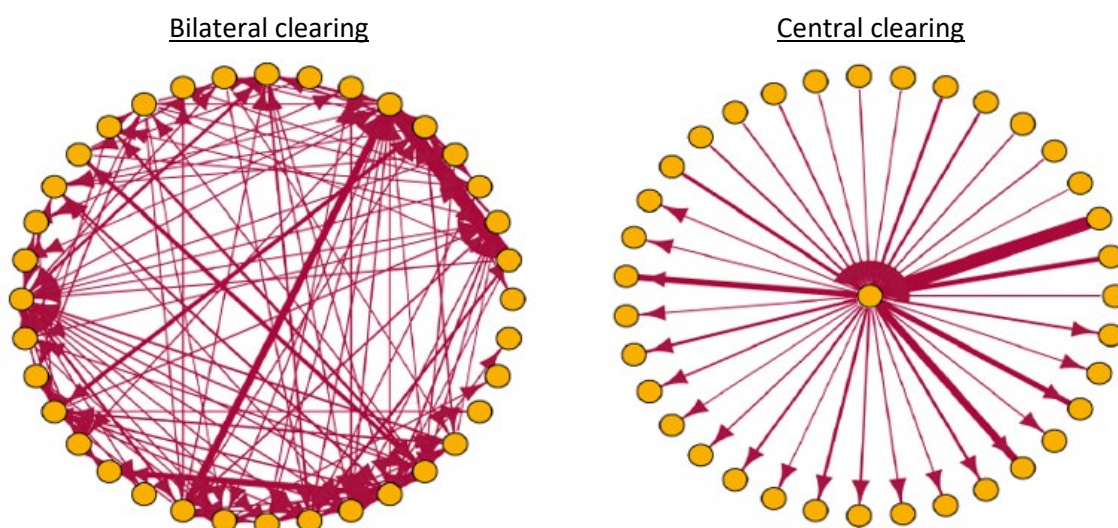
<sup>6</sup> For example, central clearing of repo requires posting of initial margin which increases as market volatility rises. This is not as prevalent in the bilateral repo market.

## Section 2: Background on central clearing and its prevalence in the gilt market

### 2.1 Central clearing, netting and counterparty credit risk

When a transaction is centrally cleared, a legal process known as ‘novation’ interposes a CCP between the buyer and the seller, such that the CCP takes on the clearing and settlement obligations of the buyer to the seller and vice versa.<sup>7</sup> Thus, the buyer and seller no longer have counterparty exposures to each other, but to the CCP (see **Figure 1**).

**Figure 1: Effect of clearing arrangements on counterparty exposures<sup>(a)</sup>**



Sources: EMIR Trade Repository data and Bank calculations.

(a) The right-hand diagram shows net obligations to deliver floating-rate payments in sterling interest rate swaps linked to six-month Libor as of 20 February 2017. The yellow circle in the centre of the figure represents the CCP, while those around the outside represent clearing members. The thickness of the red lines represents the size of the net obligation, with the arrow pointing from the floating rate payer to the receiver. The left-hand diagram shows counterfactual obligations if the market had not been centrally cleared.

Central clearing could have two different effects on the balance sheets of dealers. First, it may reduce their counterparty exposures by netting them to a greater degree. For example, if a dealer centrally cleared a repo that it had traded with one counterparty and a reverse repo that it had traded with another counterparty, it would substitute different (bilateral) counterparties for a common (central) counterparty. Subject to some other conditions (described in Section 4.1), the dealer could then net the repo (a liability) against the reverse repo (an asset), thereby reducing the total exposures on its balance sheet.

Second, to the extent that the CCP is a safer counterparty than the dealer’s trading counterparties, the counterparty credit risk of any remaining exposures would also be reduced. There are a number of reasons why this might be the case as CCPs take several steps to reduce counterparty credit risk for members of their clearing systems. First, they have membership eligibility requirements, which typically include minimum standards relating to financial strength, such as minimum credit ratings. Second, members must post collateral (or ‘margin’) in amounts sufficient to cover all but the most unlikely losses that a CCP might incur should a member default on its obligations. This includes variation margin (VM), which is paid on a daily basis – or sometimes more frequently – to cover changes in *current exposures* due to the effect of the latest moves in financial markets on contract values. It also includes initial margin (IM), which covers *potential future exposures* that could

<sup>7</sup> Clearing obligations include all requirements to service the trade prior to its settlement, such as to post collateral to the counterparty.

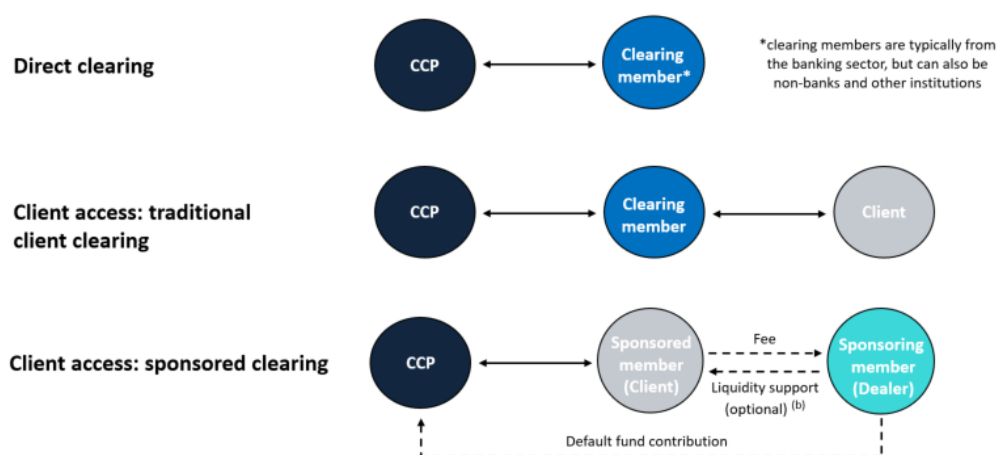


materialise due to adverse market moves while a CCP closed out the portfolio of a defaulting member. This pre-paid ‘self-insurance’ on the position increases as market volatility – and thus the potential for losses – rises. Therefore members must have sufficient liquid reserves available to meet these requirements should they increase (see section 5.2). Third, CCPs collect contributions from members to a default fund, which, along with (some of) its own equity, is available to help cover losses in the unlikely event that margins were not sufficient.<sup>8</sup> These protections help to ensure that the CCP could continue to meet its obligations to all surviving clearing members.

## 2.2 Comparison of clearing models

There are a number of different clearing models (depicted in **Figure 2**<sup>9</sup>), all of which deliver the netting benefits described above. However, each model will have other costs and benefits (introduced in Section 5) which may vary across models, for example with respect to the impact on dealer balance sheets. Availability of clearing services and eligibility for participation varies across these models and jurisdictions.

**Figure 2: Alternative central clearing models<sup>(a)</sup>**



(a) CCP is the central counterparty; ‘Dealer’ is used as shorthand for a clearing member that may provide central clearing services to other market participants (‘Clients’); solid lines denote obligations to clear (e.g. exchange margins) and settle trades; dotted lines denote auxiliary transactions that support clearing and settlement of trades.

(b) An example of liquidity support includes provision of a settlement guarantee of the trade (see page 8)

In the direct clearing model, clearing members (CMs) must meet CCP eligibility criteria and post collateral to the CCP for margins and the default fund. In practice, most CMs are securities dealers or banks. Many financial institutions, such as non-banks, are prevented from becoming direct access CMs by the eligibility criteria or the requirement to contribute resources to a mutualised default fund. Hence, alternative forms of client access to clearing have been developed to facilitate access to the CCP.

<sup>8</sup> Further resources are typically available to CCPs to help them absorb even more extreme losses and, thus, continue to meet obligations to non-defaulting clearing members (see CPSS-IOSCO (2012) for more details).

<sup>9</sup> See CPMI-IOSCO (2022) for further details on the clearing models described in this section.

In the ‘traditional’ client-clearing model, which is used widely in derivative markets, a CM centrally clears the client’s trades on its behalf. Hence, the CM is liable for settlement of the trade and payment of margins – both initial and variation – to the CCP on behalf of the client. It must also contribute additional resources to the default fund for client trades. CMs typically pass on to clients at least the cost of margin requirements imposed by the CCP, though arrangements may vary in terms of add-ons and required payment timings. Nevertheless, client clearing can be costly for clearing members, including because there are regulatory capital charges for holding client trades (given they assume the financial risk of the trade via liability for settlement). Hence, a number of CCPs offer alternative models that involve more risk sharing by the ultimate client and correspondingly lower regulatory capital charges for dealers, for example sponsored clearing.

In the sponsored clearing model, the client becomes a ‘sponsored member’ of the CCP that can centrally clear its trades, with some support from a clearing agent (or ‘sponsoring member’), which may include providing certain settlement guarantees. In the absence of such guarantees, the client is solely responsible for settling trades, while the sponsor may make a contribution to the default fund for the client’s trades.<sup>10</sup> To the extent to which the client maintains financial responsibility for the transaction, the sponsor is not required to fully recognise the exposure to the client’s trades as part of its total exposures for regulatory purposes. In addition, the sponsor may provide a liquidity facility to the client to help it with margin payments and may also handle operational interactions with the CCP. Such liquidity facilities have to be recognised in the sponsor’s regulatory exposures.

Other details of sponsored-access models vary across jurisdictions, where there are different rules in place and varying eligibility criteria. For example, hedge funds are able to access sponsored clearing for repo trades in the US (Fixed Income Clearing Corporation) and Europe (Eurex) through guarantee arrangements. This is not the case in the UK (LCH) for cash gilts and gilt repo.

**Table 2** summarises the key features of these alternative central clearing models.

**Table 2: Key features of alternative central clearing models<sup>(a)</sup>**

Clearing model	Margin payments (IM and VM)	Default fund contribution	Ultimate responsibility for trade settlement	Exposures on dealer balance sheets
Direct clearing	Dealer	Dealer	Dealer	N/A
Client access: traditional client clearing	Client (via Dealer)	Dealer	Dealer	Client trades
Client access: sponsored clearing	Client	Dealer (as sponsor)	Client	Default fund (DF) obligations
– with guaranteed settlement	Client	Dealer (as sponsor)	Dealer (as sponsor)	Guarantees and DF obligations

(a) ‘Dealer’ is used as shorthand for a clearing member that may provide central clearing services to other market participants (‘Clients’).

### 2.3 Extent of clearing in gilt and gilt repo markets

Usage rates of clearing in government bond and related repo markets vary across jurisdictions (**Table 3**). In cash markets, there is essentially no clearing in the United Kingdom and Germany.<sup>11</sup> In contrast, in Japan the vast majority of Japanese Government Bonds are cleared centrally via the Japan Securities Clearing Corporation (JSCC). This has been boosted by the JSCC’s introduction of a repo facility, SCAR,

<sup>10</sup> Some sponsored participants are not mandated to take exposure to mutualised loss mechanisms and are therefore unable to make a default fund contribution, requiring the sponsoring agent bank to do so on their behalf. In some sponsored access models, the sponsors do not make default fund contributions but initial margins can be mutualised.

<sup>11</sup> Although a clearing service is available in the UK, the average proportion of the gross daily volume of gilt trades that was centrally cleared in 2021 Q1 was less than 0.1% according to transactions data reported under MiFID II.

as part of a transformation to the JGB settlement cycle to T+1 in 2018<sup>12</sup>. The United States is an intermediate case, with nearly 15% of US Treasury trades cleared centrally, as well as 20% of trades cleared in a hybrid manner, whereby one leg of a trade intermediated by an inter-dealer broker (IDB) is cleared centrally (often this leg involves a securities dealer) and the other leg is cleared bilaterally (often this leg involves a proprietary trading firm (PTF)). This reflects a regulatory requirement for clearing members to centrally clear all of their US Treasury trades.

Clearing rates are generally a little higher in government bond repo markets. Rates are around one quarter in Germany and the United States and around one-third in the United Kingdom.<sup>13</sup> For the most part, this reflects interdealer trades, although dealer-client trades have made a meaningful contribution in recent years in the United States as the Fixed Income Clearing Corporation introduced and subsequently expanded its sponsored clearing model. The vast majority of repos are cleared in Japan, regardless of whether the collateral is a specific bond or general collateral.

**Table 3: Estimated share of centrally cleared trades in government bond markets<sup>(a)</sup>**

<i>Per cent of trades that are centrally cleared</i>	Germany	Japan	United Kingdom	United States
Cash	0	80+	0	15 <sup>(b)</sup>
Repo	25	80	35 <sup>(c)</sup>	25

Sources: Bank of Japan (2022), Barone et al (2022), Infante et al (2022), Treasury Market Practices Group (2019) and Bank calculations.

(a) Approximate figures, reported to the nearest five percentage points. (b) In addition, a little under 20% of trades involve hybrid clearing, whereby one leg of a trade intermediated by an inter-dealer broker is cleared centrally and the other leg is cleared bilaterally.

(c) On average for repo and reverse repo.

In the UK, traditional client clearing is not currently used in cash and repo gilt markets. Rather, sponsored clearing is used in the gilt repo market, though it only accounts for a very small share of the market. In contrast, this form of access is significantly more developed in the United States.

### Section 3: Effect of expanding cash gilt clearing on dealer balance sheets

In this section, we estimate how settlement obligations and total exposures (as measured under the Basel III leverage ratio) of UK bank-affiliated dealers, and hence their capital ratios, would have been affected if all cash gilts had been cleared centrally at the time of the DFC crisis.

Under the risk-based capital requirements of Basel III, dealer-banks have to hold capital against settlement risk, which is the risk of loss due to counterparty defaults before the final settlement of trades. When dealers intermediate higher volumes of trading activity, as during the DFC period, their settlement obligations may rise, boosting their settlement risk and capital requirements. If dealers did not have sufficient capital to meet such increased requirements, or could not quickly raise it, they would be limited in their ability to expand their intermediation. By increasing the scope for security purchases and sales to be netted, central clearing may reduce the settlement obligations that arise

<sup>12</sup> SCAR is the Subsequent Collateral Allocation Repo facility is a General Collateral (GC) financing facility. It enables JGB GC repo to transact with same-day (T+0) settlement by automating matching, collateral allocation (from a defined basket) and settlement in within a short time period (ICMA, 2022)

<sup>13</sup> The 30% figure for the UK reflects the average proportion of outstanding of gilt-repo trades that was centrally cleared in 2021 Q1 according to Sterling Money Market Data reports.

from trading, which could loosen any proximate capital constraints and, hence, boost dealer intermediation.

In addition to the risk-based capital requirements, dealer-banks must hold sufficient capital to comply with Basel III's leverage ratio. This is a simple ratio of capital to total exposures, which is intended to restrict the build-up of leverage in the banking system and reinforce the risk-based capital requirements with a non-risk-based "backstop" measure.<sup>14</sup> In a similar effect to that of settlement obligations, intermediation can boost leverage-ratio exposures and, thus, capital requirements. Measures that increase the scope for netting of cash receivables and cash payables (which are leverage-ratio exposures associated with unsettled security sales and purchases) could therefore reduce leverage-ratio capital requirements and, hence, support dealer intermediation.

At the time of the DFC crisis, central clearing would have had that effect for some dealers depending on how their adopted accounting standard treated unsettled trades. Since the beginning of 2023, however, harmonising changes to the computation of leverage-ratio exposures in Basel III have allowed cash receivables and cash payables to be netted regardless of counterparty under all accounting standards. This achieves the same netting as clearing all cash trades with a single counterparty, such as a CCP. Thus, our estimates of the effect on leverage-ratio exposures of centrally clearing all cash gilt trades at the time of the DFC crisis could be better viewed as an indication of the netting benefits that the Basel III changes will bring to dealers' cash gilt exposures.

### 3.1 Background

#### 3.1.1 Settlement obligations

As there is no central clearing in the cash gilt market, the settlement obligations of dealers arising from their trading activity depends on the degree to which their purchases and sales of particular gilts have common (non-CCP) counterparties. Where that is the case and a netting agreement is in place (as is common in practice), the trades can be netted, leaving relatively small amounts of bonds to be exchanged for cash.

Beginning with a dealer's gross trading volume ( $GTV_t$ ), which, on a given date ( $t$ ), is the sum of its purchases ( $P_{b,c,t,\tau}$ ) and sales ( $S_{b,c,t,\tau}$ ) of different bonds ( $b$ ) (settling on date  $\tau$ ) with various counterparties ( $c$ ),

$$GTV_t = \sum_{b=1}^B \sum_{c=1}^C (P_{b,c,t,\tau} + S_{b,c,t,\tau}), \quad (1)$$

its gross settlement obligations ( $GSO_t$ ) are:

$$GSO_t = \sum_{b=1}^B \sum_{c=1}^C \sum_{s=1}^t (P_{b,c,t,\tau} + S_{b,c,t,\tau}), \quad \text{where } t < \tau. \quad (2)$$

Thus, GSOs are the sum of purchases and sales executed up to the current date ( $t$ ), but which have not yet settled ( $t < \tau$ ). GSOs could be greater than GTVs if settlement takes more than one day, so that settlement obligations would cumulate as the days go by, or if there are settlement fails such that trades that were due to settle on or before  $t$  are subsequently expected to settle (shortly) after  $t$ .<sup>15</sup> However, as gilt trades have to be settled one business day after execution and the rate of settlement

<sup>14</sup> See Financial Stability Institute (2017) for a summary of the Basel III leverage ratio framework.

<sup>15</sup> In such cases,  $\tau$  refers to the new expected settlement date.

fails for these trades is low, we assume that gross settlement obligations are equal to gross trading volumes.<sup>16</sup> This also means we can simplify our notation, by dropping  $\tau$  subscripts:

$$GSO_t = GTV_t = \sum_{b=1}^B \sum_{c=1}^C (P_{b,c,t} + S_{b,c,t}), \quad (3)$$

Then, for settlement obligations of trades undertaken on date  $t$  to be netted, they must be in the same bond and with a common counterparty. This gives net settlement obligations (NSOs) of:

$$NSO_t = \sum_{b=1}^B \sum_{c=1}^C |P_{b,c,t} - S_{b,c,t}|. \quad (4)$$

Central clearing would reduce net settlement obligations by substituting the dealer's various trading counterparties for a single counterparty (the CCP), thereby increasing the scope for netting of purchases and sales with a common counterparty. Under comprehensive central clearing, the dealer's net settlement obligations ( $NSO_t^*$ ) on any given date would be:

$$NSO_t^* = \sum_{b=1}^B |P_{b,t} - S_{b,t}|, \quad (5)$$

$$\text{where } P_{b,t} = \sum_{c=1}^C P_{b,c,t} \text{ and } S_{b,t} = \sum_{c=1}^C S_{b,c,t}$$

where  $c$  still refers to the original counterparties.

The reduction in net settlement obligations from  $NSO_t$  to  $NSO_t^*$  would reduce the volume of trades vulnerable to settlement risk. As described in Section 2.1, this risk would be further reduced for the dealer to the extent that the CCP is a more robust counterparty than the original trading counterparties. In addition, a reduction in settlement obligations would reduce the risk of settlement fails. Settlement fails can be costly as they may prevent a counterparty from using the cash or securities they were due to receive in a manner they had planned. In addition, penalty fees may have to be paid by way of compensation when the trade is eventually settled. Moreover, costs can spill over from one counterparty to another. For instance, a dealer failing to receive a particular bond from one counterparty may be unable to deliver it to another counterparty. In this case, the dealer would have to pay a penalty fee through no fault of its own (although it would receive a penalty fee from the counterparty that failed to deliver the bond).

### 3.1.2 Leverage-ratio exposures

Before 2023, the extent to which a dealer's trading activity boosted its total exposures as measured under the Basel III leverage ratio (known as the Leverage Exposure Measure (LEM)) depended on its adopted accounting standard. If the dealer used settlement-date accounting, purchases and sales would not have been recorded on the balance sheet until they had settled. Hence, unsettled trades would have had no effect on the dealer's LEM. However, if the dealer used trade-date accounting, payables and receivables would have been recorded on the balance sheet for purchases and sales respectively at the time of trade execution. As payables and receivables are both cash items, they can be netted across *different securities* (which means the LEM allows for more netting than NSOs). Moreover, under US GAAP accounting standards, the dealer may have netted payables and receivables across *different counterparties* as well as *different securities*. Under IFRS accounting

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<sup>16</sup> The average settlement failure rate for gilts is about 2% based on 2020-22 data from Euroclear UK & International. In addition, a trade could remain unsettled for two or more days due to when-issued trading, i.e. trading of bonds due to be issued in the near future. However, when-issued trading is negligible in our data sample.

standards, however, payables and receivables may only have been netted with common counterparties.<sup>17</sup>

**Figure 3** illustrates these effects. It considers a dealer's purchase of £2 of gilts maturing in 2027 from one counterparty and a sale of £1 of gilts maturing in 2029 to another counterparty. Panel 1 shows how the dealer's balance sheet would have been affected by these trades, depending on its accounting practice, under the status quo (i.e. without central clearing). The dealer's pre-trade balance sheet is shown on the left. Then, in the middle, there are three trade-date balance sheets showing the effects of the new trades under the different accounting practices. Under settlement-date accounting, the balance sheet would not have been affected. Under IFRS trade-date accounting, the payables and receivables could not have been netted because they were with different counterparties, so the LEM would have increased by £2. Under US GAAP trade-date accounting, however, payables and receivables could have been netted across counterparties, so the LEM would have increased only by £1. Finally, once the trades had settled, any payables and receivables would have disappeared from the balance sheet and the LEM would have reverted to its original value, as shown on the right.

Panel 2 shows how the dealer's balance sheet would have been affected under the counterfactual of comprehensive central clearing. As central clearing substitutes the dealer's original counterparties for a single counterparty (the CCP), the effects are equivalent to the dealer being able to net across those counterparties. So, if the dealer used trade-date accounting, its trade-date LEM would have been the same as under US GAAP standards, even if it had used IFRS standards. However, if the dealer used settlement-date accounting, its trade-date balance sheet would have remained unaffected.

These effects of unsettled trades on the LEM can be written down more generally as:

$$\Delta LEM_t^{SD} = 0 \quad (6)$$

$$\Delta LEM_t^{TD(IFRS)} = \sum_{c=1}^C \max(P_{c,t} - S_{c,t}, 0) \text{ where } P_{c,t} = \sum_{b=1}^B P_{b,c,t} \text{ and } S_{c,t} = \sum_{b=1}^B S_{b,c,t} \quad (7)$$

$$\Delta LEM_t^{TD(GAAP)} = \max(P_t - S_t, 0) \text{ where } P_t = \sum_{c=1}^C \sum_{b=1}^B P_{b,c,t} \text{ and } S_t = \sum_{c=1}^C \sum_{b=1}^B S_{b,c,t} \quad (8)$$

$$\Delta LEM_t^{SD*} = 0 \quad (9)$$

$$\Delta LEM_t^{TD*} = \Delta LEM_t^{TD(GAAP)} \quad (10)$$

where  $\Delta LEM$  is the change in the LEM arising from purchases ( $P$ ) and sales ( $S$ ) of different bonds ( $b$ ) with different trading counterparties ( $c$ ) on date  $t$ ,  $SD$  denotes settlement-date accounting,  $TD$  denotes trade-date accounting,  $IFRS$  and  $GAAP$  denote the different accounting standards and an asterisk denotes counterfactual effects under comprehensive central clearing.

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<sup>17</sup> The rationale for the treatment under US GAAP is that on any given day the receivables from one counterparty could be used to meet payables to another counterparty, while the more conservative treatment under IFRS recognises the risk that the counterparty owing the receivables could default, meaning those receivables would not be available to the dealer to meet its payables.

**Figure 3: Effect of unsettled security trades on the leverage exposure measure (LEM) at the time of the DFC crisis**

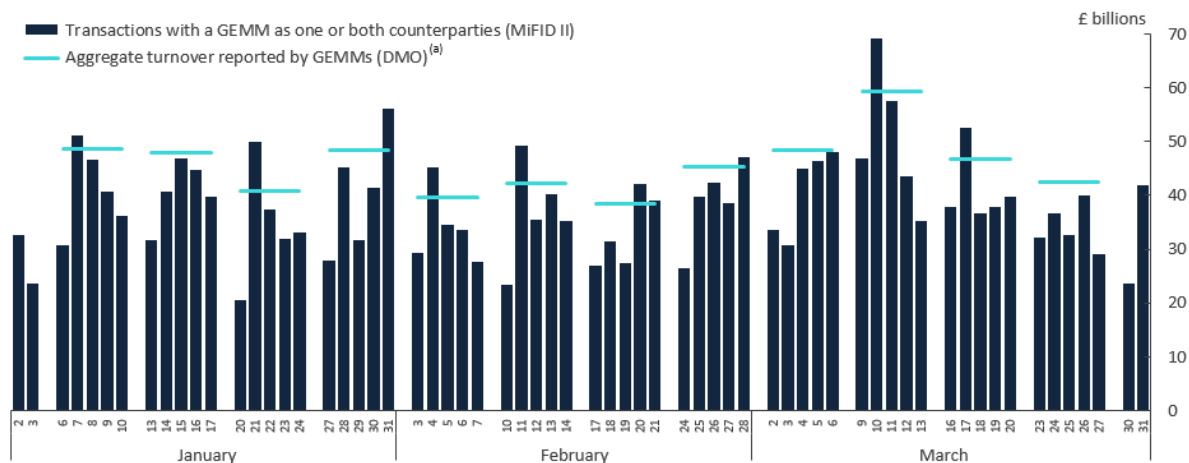
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Since the beginning of 2023, however, the Basel III standards have been harmonised such that all bank-affiliated dealers should calculate their LEM as if they use trade-date accounting under US GAAP standards. This means that the three different cases in the middle of Panel 1 should converge to the central case, and the three cases in the middle of Panel 2 should also converge to the central case.<sup>18</sup> So, going forwards, central clearing of security transactions would not make any difference to dealer LEMs. Hence, any increase in the share of transactions cleared centrally should not be expected to support dealer intermediation of gilts or any other securities by relaxing any binding or near-binding leverage-ratio constraints. The different cases in Figure 3 remain relevant, however, to our analysis of dealer balance sheets during the DFC stress. In addition, the effects of central clearing may be viewed as an illustration of the effects that the harmonising changes to Basel III may bring for those dealers not using trade-date accounting under US GAAP.

### 3.2 Data

The key data source we employ to calculate the effects of gilt trading activity on dealer settlement obligations and leverage-ratio exposures is a comprehensive set of gilt transactions reported under European Union Directive 2014/65, commonly known as ‘MiFID II’. Each trade record in this database includes the International Securities Identification Number (ISIN) of the security, the Legal Entity Identifier (LEI) of the buyer and the seller and the price, quantity and timestamp of the trade. We focus on trades in the first quarter of 2020. After some data cleaning, the time series of trade volumes reported by the UK Gilt-Edged Market Makers (GEMMs) in the MiFID II data is similar to what they report to the UK Debt Management Office (DMO) (see **Chart 1**).<sup>19</sup>

**Chart 1: Total daily value of gilt trades involving GEMMs in 2020 Q1**



Sources: DMO, MiFID II, Bank calculations.  
(a) Weekly totals divided by five.

<sup>18</sup> BCBS (2016) discusses the effects of different accounting treatments on the LEM (see Section II.2), while BCBS (2022) details the harmonised treatment to take effect from 1 January 2023 (see Section 30.10). The permitted netting in this treatment is subject to two conditions, which are typically met: (i) the assets are fair valued through income and included in the bank’s regulatory trading book and (ii) the transactions are settled on a delivery-versus-payment (DvP) basis.

<sup>19</sup> Data cleaning includes (i) identification of prices reported in pounds and conversion of these into pence, (ii) removal of duplicate trade records where both counterparties report, (iii) removal of ‘booking’ trades, e.g. where a broker books trades to the accounts of its clients, (iv) removal of trades with spurious time stamps (i.e. weekends) or market values (i.e. large outliers).



**Table 4** shows some summary statistics for our transactions dataset. In January and February 2020, before the DFC crisis, a typical GEMM executed around 200 gilt trades per day, worth about £2 billion in total. These amounts surged by around 50% on 10 March, the day of peak trading during the DFC. Trades were generally quite concentrated, which suggests potential for netting to reduce exposures. For instance, the largest 5% of trades by count typically accounted for around one-third of total transaction value, while the top 5 bonds and top 5 counterparties (often other GEMMs) typically accounted for more than half and more than two-thirds of that value respectively.

**Table 4: Descriptive statistics of MiFID II gilt transactions data**

Statistic	Percentile of statistic across GEMMs					
	Pre-DFC daily average			Peak trading day during DFC		
	25	50	75	25	50	75
Number of trades	183	214	262	205	323	482
Total value of trades (£ bn)	1.7	2.4	2.8	2.5	3.7	5.4
Mean trade size (£ mn)	8.8	10.0	10.7	7.9	11.2	14.5
Share of trade value of largest 5% of trades (%)	32.8	35.7	41.0	28.6	33.8	42.0
Number of counterparties	38	46	63	43	63	78
Share of trade value of top-5 counterparties (%)	69.0	71.8	80.9	59.8	73.2	86.1
Number of bonds traded	44	52	58	45	57	71
Share of trade value of top-5 bonds (%)	52.1	57.1	60.7	50.2	58.0	75.3

Sources: MiFID II and Bank calculations.

### 3.3 Results

#### 3.3.1 Settlement obligations

**Table 5** shows daily trading volume of gilts by GEMMs and the extent to which they would have been reduced by netting to arrive at settlement obligations, both under the status quo at the time of the DFC and the counterfactual of comprehensive central clearing. For comparison, the table also shows similar results for trading of US Treasury securities by US dealers, as reported in Fleming and Keane (2021). For each market, the table shows average daily totals across dealers for the period before/around the DFC crisis, as well as totals for the day of peak trading volume during that crisis. Compared to the status quo, central clearing would have reduced total dealer settlement obligations in the gilt market by £15 billion (or 48%) on an average trading day before/around the crisis, rising to £27 billion (or 53%) on the peak trading day. Thus, instead of surging by £21 billion between average and peak trading days, settlement obligations would have increased by only £9 billion, a reduction of 60%. This is a similar, albeit slightly smaller, proportionate reduction in settlement obligations than in the US Treasury market.

**Table 5: Dealer settlement obligations in the DFC period**

	UK gilts (£ billions)			US Treasuries (US\$ billions)		
	Pre-crisis <sup>(a)</sup>	Peak day <sup>(b)</sup>	Difference	Baseline <sup>(c)</sup>	Peak day <sup>(d)</sup>	Difference
Gross trading volume (GTV)	37	71	33	752	1,217	465
Gross settlement obligations (GSO) <sup>(e)</sup>	37	71	33	881	1,750	869
Net settlement obligations (NSO) (current clearing) <sup>(f)</sup>	30	51	21	544	1,020	476
Net settlement obligations (NSO) (central clearing)	15	24	9	220	337	117
<i>Memo:</i>						
Change in NSOs: central clearing vs. current clearing (%)	-48	-53	-60	-60	-67	-75

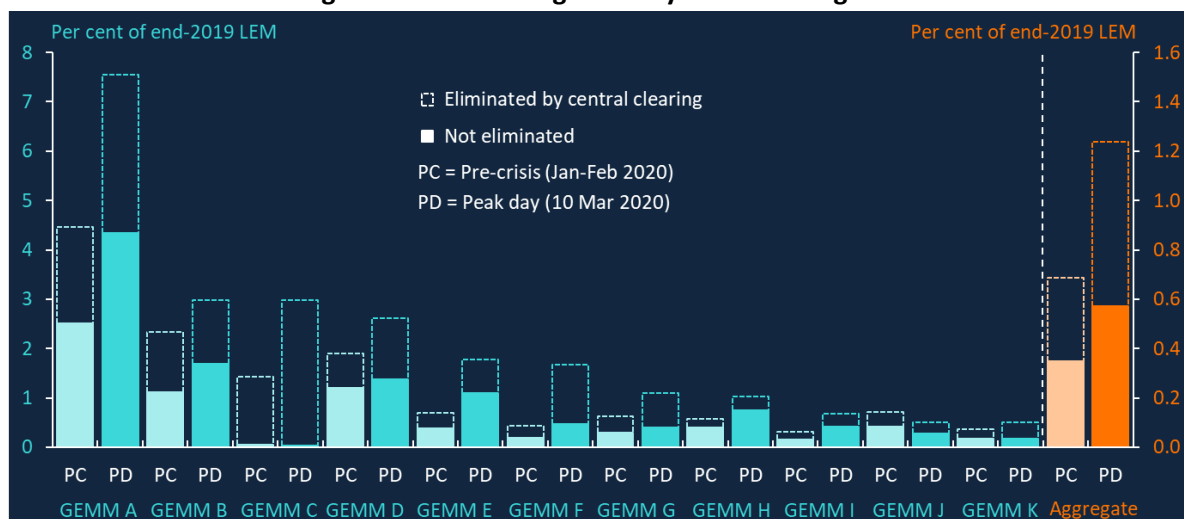
Sources: Fleming and Keane (2021), MiFID II transactions data and Bank calculations.

(a) 'Pre-crisis' = 2 Jan - 25 Feb 2020. (b) 'Peak day' (for UK gilts) = 10 Mar 2020. (c) 'Baseline' = 2 Jan - 30 Apr 2020 for GTV and GSO and 2 Jan - 25 Feb & 1 Apr - 30 Apr 2020 for other rows. (d) 'Peak day' (for US Treasuries) = 28 Feb 2020. (e) For UK gilts, GSO is assumed equal to GTV. For US Treasuries, there is a significant difference between these two metrics as around 12% of trades settled in two days or longer during this period, mostly due to when-issued trading. (f) For UK gilts, 'current clearing' allows for bilateral netting with all trading counterparties, while there is no central clearing. For US Treasuries, 'current clearing' allows for multilateral netting of trades in the inter-dealer market, which is centrally cleared, but does not allow for bilateral netting elsewhere due to data limitations.

To put these figures into context, **Chart 2** shows the extent to which central clearing of cash gilt trades would have reduced the settlement obligations of (anonymised) individual dealers in 2020 Q1 relative to their total exposures (as measured by their LEMs). In aggregate, central clearing would have eliminated settlement obligations equivalent to 34 basis points of LEM on an average trading day before the DFC crisis and 67 basis points on the peak trading day during that crisis. Hence, it would have reduced the surge in settlement obligations between average and peak trading days from 55 basis points of LEM (difference between the total heights of the orange bars) to 23 basis points of LEM (difference between the heights of the solid orange bars). For some dealers, however, the reduction in the settlement obligation surge would have been significantly greater (for example, from 308 basis points to 184 basis points of LEM for GEMM A), while for others it would have been much smaller.

While these settlement obligations might appear significant at face value, the counterparty risk associated with them is relatively small. One reason is that the probability of a counterparty failing within the one-day settlement window is usually remote. In addition, even if a counterparty did fail, dealers would not be at risk of losing the full market value of their unsettled gilt trades as they are settled on a delivery-versus-payment (DVP) basis. So, if a counterparty did not deliver a bond, the dealer would not deliver payment, and its loss would be limited to any price appreciation of the bond that it did not come to own. Conversely, if the counterparty did not deliver payment, the dealer would not deliver the bond, and its loss would be limited any price depreciation of the bond that it continued to own. Either way, based on historical price moves, the dealer’s potential loss would usually not exceed one percentage point of the market value of the unsettled trade, assuming it could implement the same trade with a different counterparty within a day or two.<sup>20,21</sup> A non-defaulting counterparty may also fail to settle with the dealer at T+1, but in such cases the counterparty would eventually settle the trade on the terms agreed and, in some cases, pay compensation for the delay.<sup>22</sup>

**Chart 2: Cash gilt settlement obligations by dealer during the DFC crisis<sup>(a)</sup>**



Sources: MiFID II, regulatory bank filings and Bank calculations.

(a) The dealers are all GEMMs active in 2020 Q1 except for five London-based branches of international banks (which do not publish exposure data at branch level) and two other GEMMS with much smaller trading volumes than the rest.

<sup>20</sup> Reflecting these factors, the contribution of settlement risk to risk-weighted assets of a UK dealer is typically only a fraction of a percentage point, so there is limited risk for central clearing to reduce.

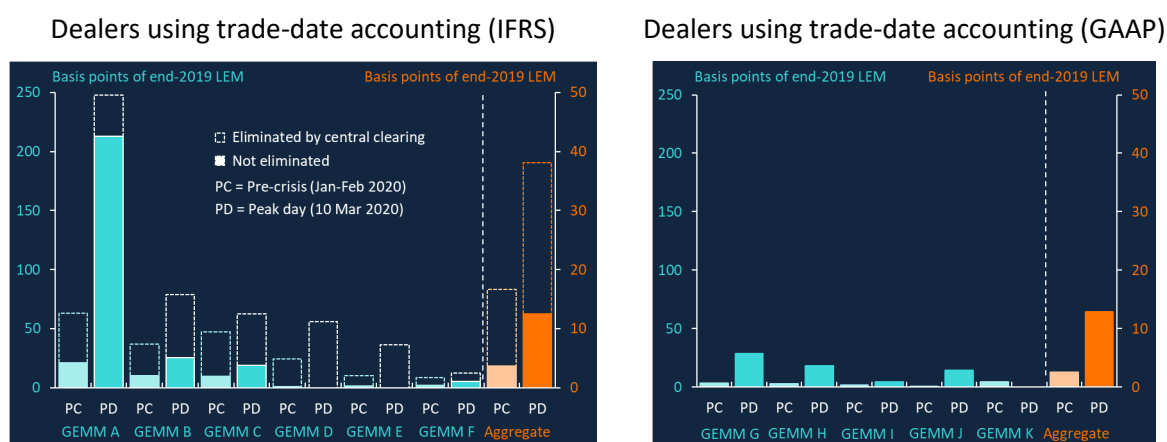
<sup>21</sup> In addition, the dealer may incur funding costs. For example, it may have borrowed in order to buy a bond (which it then did not receive) or it may have been prevented from reducing its borrowing by a failure to complete a gilt sale. However, a few days of interest at typical bank funding rates would only amount to a few basis points of the trade value.

<sup>22</sup> Most gilt trades that initially fail to settle do subsequently settle within a few days.

### 3.3.2 Balance-sheet exposures

However, total exposures, which are a key determinant of leverage ratios, could be an alternative source of constraint on dealer intermediation. **Chart 3** shows unsettled gilt exposures in 2020 Q1 recorded by GEMMs, depending on their adopted accounting standards. Across the six GEMMs that used trade-date accounting under IFRS, such exposures were equivalent to 17 basis points of LEM on an average trading day in the period before the DFC crisis, rising to 38 basis points on the peak trading day during that crisis (left panel, orange bars). Thus, the surge in unsettled gilt exposures between average and peak trading days was equivalent to 21 basis points of LEM. Comprehensive central clearing would have eliminated the majority of these exposures: they would have been almost 80% lower in the pre-DFC period at 4 basis points of LEM, while they would have been about two-thirds lower on the peak trading day at 12 basis points of LEM. Thus, the surge in exposures would have been reduced by around 60% to 9 basis points of LEM (difference between the heights of the solid orange bars). A further five GEMMs used trade-date accounting under US GAAP. Across this group, unsettled gilt exposures were much smaller (given the ability to net cash payables and receivables across different counterparties), equivalent to 3 basis points of LEM on an average trading day in the period before the DFC crisis, rising to 13 basis points on the peak trading day during that crisis. Central clearing would not have eliminated any of these exposures. No GEMMs in our sample used settlement-date accounting, under which unsettled trades would have had no impact on exposures.<sup>23</sup>

**Chart 3: Exposures relating to unsettled cash gilt trades during DFC crisis<sup>(a)</sup>**



Sources: MiFID II, regulatory bank filings and Bank calculations.

(a) The dealers in the chart are the GEMMs that were active in 2020 Q1 except for five London-based branches of international banks (which do not publish exposures data at branch level) and two other GEMMs with much smaller trading volumes than the rest.

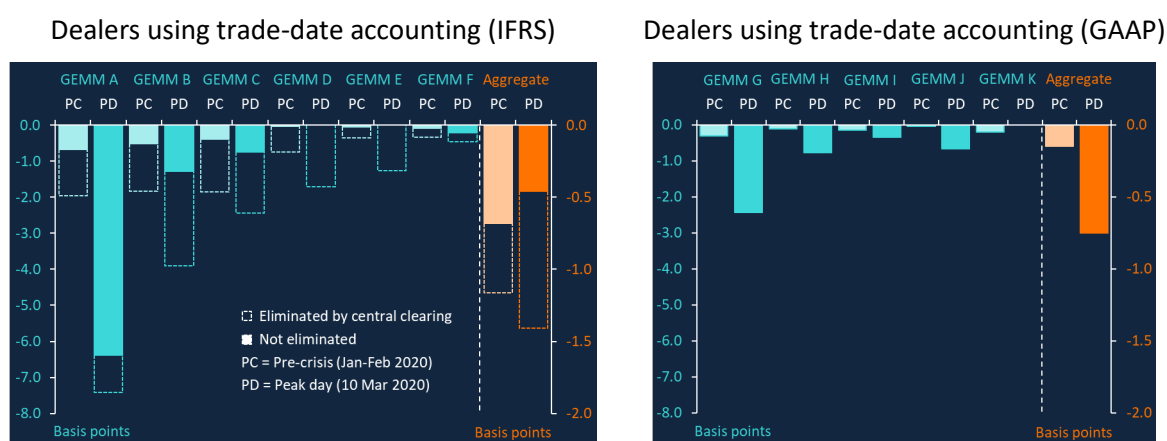
**Chart 4** shows the extent to which these unsettled gilt exposures weighed on GEMM's leverage ratios. For the six GEMMs using trade-date accounting under IFRS, unsettled gilt exposures would have pulled down leverage ratios by 1.25 basis points on average in the days preceding the DFC crisis and by nearly 1.5 basis points on the day of peak trading volume during that crisis (left panel, total heights of the orange bars). Central clearing could have eliminated 42% and 67% of those leverage-ratio impacts, respectively (left panel, solid-shaded orange bars). Hence, instead of the average leverage ratio being pulled down by a further 0.25 basis points by the surge in exposures between the pre-crisis period and

<sup>23</sup> Some GEMMs did use settlement-date accounting, but these were London-based branches of international banks that do not feature in Chart 3 due to the lack of exposure data at branch level.

the peak of the crisis (left panel, difference between the total heights of the orange bars), central clearing could have eliminated this effect and, in fact, slightly reversed it (left panel, difference between the heights of the solid orange bars). The five GEMMs using trade-date accounting under US GAAP, did experience an increased drag on leverage ratios as exposures surged between the pre-crisis period and the peak of the crisis (right panel), but, as discussed previously, central clearing would not have affected that result. Similarly, any dealers using settlement-date accounting would not have recorded any impact on the leverage ratio from unsettled gilt trades.

The 1.5 basis points of drag of unsettled gilt exposures on the average leverage ratio of GEMMs using trade-date accounting under IFRS is small relative to the 70 basis points of headroom over supervisory expectations that these dealers had in aggregate at end-2019.<sup>24</sup> However, capital has to support all dealer activities. If gilt trading desks represented, say, one-twentieth of those activities, their share of the capital headroom would have been about 3 basis points. While that is still larger than the 1.5 basis points of drag, not all GEMMs had that much headroom and for some GEMMs the drag was significantly larger than 1.5 basis points (see **Chart 4**). Hence, it does not seem implausible that the surge in LEMs arising from unsettled gilt trades during 2020 Q1 may have constrained the ability of some trading desks to intermediate, especially at dealers using trade-date accounting under IFRS.

**Chart 4: Effect of unsettled cash gilt exposures on leverage ratios during DFC<sup>(a)</sup>**



Sources: MiFID II, regulatory bank filings and Bank calculations.

(a) The dealers in the chart are the GEMMs that were active in 2020 Q1 except for five London-based branches of international banks (which do not publish exposures data at branch level) and two other GEMMs with much smaller trading volumes than the rest.

Recall, however, that the harmonising changes to Basel III will ease any such constraints going forwards by allowing dealers to net payables and receivables regardless of the counterparty. If it had been in place during the DFC crisis, such a policy would have had the same effect as comprehensive central clearing, i.e. it would have eliminated the dotted bars in Chart 3 and 4.<sup>25</sup> This suggests that the potential impact of greater central clearing of securities on dealers' leverage ratios is negligible, leaving only the reduction in settlement obligations – and hence settlement risk – as the spur to dealer intermediation from such a policy.

<sup>24</sup> While banking groups have formal regulatory requirements for the leverage ratio, UK-based subsidiaries of these groups were subject to a supervisory expectation that their leverage ratios would be at least 3%.

<sup>25</sup> In the UK, in response to the Covid-19 crisis, the Prudential Regulatory Authority (PRA) permitted banks to adopt this approach early, from April 2020, with the aim of supporting market-making and market functioning (see [PRA statement](#)).

## Section 4: Effect of expanding gilt repo clearing on dealer balance sheets

### 4.1 Background

Government bond repo is a low margin, balance sheet intensive business which historically required little capital to be held against it. Given their fully collateralised nature, repo transactions have a Basel capital risk-weighting at or near 0%, and therefore do not materially impact the capital ratio of banks. While this may be a good representation of potential credit risk, however, it fails to capture the build-up of excessive leverage within the banking sector. This can cause forced deleveraging at times of stress which can amplify downward price moves, which was seen during the GFC. To address those inadequacies, the Basel Committee on Banking Supervision (BCBS) introduced a leverage ratio requirement in 2016. This required banks to hold a certain amount of capital based upon the total size of their balance sheet (subject to certain adjustments, including for off-balance sheet items), and therefore imposed a material capital charge on bank's repo activity.

**Figure 4** demonstrates the balance sheet impact of a repo transaction. It considers two dealers (A and B) with identical balance sheets. Dealer A borrows £1 cash from dealer B in the form of a repurchase agreement. The gilt pledged as collateral by dealer A remains on their balance sheet, since they remain exposed to changes in the price of the asset (having agreed to repurchase the gilt at a given price plus the repo rate at a fixed point in the future). The cash received from dealer B will be added to the asset side, while the repo borrowing to be paid back to dealer B at maturity is added as a liability. As the asset side of the dealer's balance sheet has expanded, dealer A will need to hold additional capital in order to comply with the leverage ratio requirement. In contrast, the balance-sheet size and leverage-ratio capital requirement of dealer B, which has engaged in a reverse repo transaction, is unaffected.

**Figure 4: Balance sheet impact of repo transactions**

Dealer A borrows £1 cash from dealer B in a gilt repurchase agreement

Pre-trade (t=-1)				Trade date (t=0)				
Dealer A and B's initial balance sheet				Repo (Dealer A)		Reverse repo (Dealer B)		
Assets		Liabilities		Borrow cash		Lend cash		
Cash	4	Debt	4	Cash	4	Cash	4	
Gilts	1	Equity	1	Encumbered gilts	1	Gilts	1	
				Cash received	+1	Cash lent	-1	
					Repo borrowing	+1	Repo lending	+1
Total	5	Total	5	Total	6	Total	5	
LEM		5		LEM		5		

Dealer A then lends £1 cash from an NBFI in a gilt repurchase agreement

Repo (Dealer A)				Repo and reverse repo (Dealer A)			
Assets		Liabilities		Assets		Liabilities	
Cash	4	Debt	4	Cash	4	Debt	4
Encumbered gilts	1	Equity	1	Gilts	1	Equity	1
Cash received	+1	Repo borrowing	+1	Cash received	+1	Repo borrowing	+1
				Cash lent	-1		
				Repo lending	+1		
Total	6	Total	6	Total	6	Total	6
LEM		6		LEM		6	

In general, reverse repos do not affect the size of the balance sheet of the market participant undertaking the reverse repo. This is also the case for a dealer that lends cash in a reverse repo

transaction that it initially received in a repo transaction. Such borrowing and lending is often referred to as “matched book” repo. As shown in the bottom row of Figure 4, the cash loan reduces dealer A’s cash and a reverse repo asset appears on its balance sheet, whilst the underlying collateral, although pledged to the dealer, remains on the client’s balance sheet and does not become an asset of the cash lender.

However, an important exception to this general treatment arises in the UK for firms placing cash with the central bank. Under the UK leverage ratio framework certain qualifying central bank claims are exempt from the leverage ratio measure.<sup>26</sup> For example, dealer A could place the cash received from the repo transaction with the central bank, and the resulting central bank claim could be excluded from the leverage ratio calculation if certain conditions are met.

Under current leverage ratio standards, dealers can also reduce their balance sheet exposure arising from repo intermediation through “netting”, thus reducing the amount of capital they need to hold. In order for a repo and a reverse-repo transaction to be nettable, they must meet three conditions: (i) they must be with the same counterparty, (ii) have the same final settlement date (i.e. maturity date) and (iii) the two counterparties must have an agreement in place to settle net. Repo and reverse repo transactions that meet these conditions and are of identical amounts of cash received/payable can be netted even if the underlying collateral is different. These transactions will not incur a balance sheet impact or the associated leverage capital requirement.<sup>27</sup>

In our analysis, to estimate the amount of nettable gilt repo we assume that condition (iii) – that counterparties agree to settle net whenever possible – holds by default.<sup>28</sup> As set out in conditions (i) and (ii), to be nettable repo and reverse repo transactions of a given dealer must also have the same maturity date ( $t$ ) and counterparty ( $c$ ). To calculate the nettable stock per dealer ( $d$ ), on any given date ( $t$ ) for each dealer-counterparty pair we find the minimum stock of repo or reverse repo that meets these conditions:

$$Nettable\ repo_{d,t} = \sum_{c=1}^C Min(repo_{d,c,t}, reverse\ repo_{d,c,t}) \quad (9)$$

To arrive at the market-wide estimate of nettable repo/reverse repo we sum those results across dealers and double to account for both repo and reverse repo sides of the transaction:<sup>29</sup>

$$Total\ nettable_t = 2 \sum_{d=1}^D (Nettable\ per\ dealer)_{d,t} \quad (10)$$

The formulas above apply in the bilaterally cleared repo market, where dealers net their transactions directly with the client. Central clearing offers further netting opportunities over and above those that can be realised in a bilateral repo market as it collapses bilateral exposures into exposures to a single counterparty – the CCP (see section 2). Thus, in the case of centrally cleared trades, a CCP is treated as a single counterparty, and any transactions that are cleared by a reporting institution will be

<sup>26</sup> Since 2017, PRA rules require firms within the scope of the leverage ratio requirement to exclude deposit-matched central bank claims from their UK leverage ratio where they are denominated in the same currency and are of the same or longer maturity.

<sup>27</sup> See page 7 of BCBS (2014).

<sup>28</sup> The data to estimate this condition is not available within SMMD. However dealers will have a Global Master Repurchase agreement in place with LCH enabling them to trade, and they would both have incentives to net where possible.

<sup>29</sup> As the inter-dealer market is almost entirely centrally cleared, there are essentially no outstanding dealer-to-dealer trades, only dealer-to-CCP and dealer-to-client trades. Hence, every nettable trade for one of our dealers is also a nettable trade for a counterparty outside our dataset.

calculated as nettable if they mature on the same date, regardless of the ultimate transaction counterparty. Hence, in the case of a fully centrally cleared market the equivalent of formula (9) is:

$$\text{Nettable } repo_{d,t} = \text{Min}(repo_{d,t}, \text{reverse } repo_{d,t}) \quad (11)$$

## 4.2 Data

For our analysis of the gilt repo market we use the Bank of England Sterling Money Market Daily (SMMD) data collection. This is a daily, transaction-level collection, covering the most significant segments of the sterling money markets which has been gathered by the Bank from reporting institutions<sup>30</sup>. In early 2021, total market size, as estimated by the outstanding stock of gilt repo and reverse repo reported by dealers in SMMD, was approximately £1trn.<sup>31</sup> Several non-bank financial institutions (NBFIs) rely upon the gilt repo market as part of their business models. Hedge funds are significant lenders and borrowers in the gilt repo market, using repo and reverse-repo transactions to facilitate their macro trading strategies. LDIs and pension funds are predominantly active at longer maturities (3 months or longer), and are significant borrowers in the repo market, while money market funds (MMFs) are primarily lenders, typically placing cash overnight.

The data covers around 95% of the overall value of transactions at maturities between overnight and one-year. The transaction data includes information on transaction amount, dealer's counterparty information, maturity dates, repo rate and collateral underlying the transaction. The stock of repo is not reported directly, but can be estimated using the reported transactional data, given we believe most of the transactions in the market mature within one year. It is important to note that the data does not cover activity where neither party is a reporting dealer, but this missing activity is estimated to be relatively small.

For some transactions in the dataset the counterparty information is not reported. Since knowing the counterparty is necessary to ascertain whether a repo transaction is nettable, we remove these transactions from our analysis. This leaves us with a dataset capturing approximately 90% of the value of reported transactions in the gilt repo market. The analysis on the gilt repo market presented below is based on this restricted sample.

**Table 6** summarises the SMMD transaction-level dataset. The number of trades increased for some key gilt repo dealers during the DFC compared to January-February 2020, but volumes did not surge to the same extent as seen in gilts. Trading is similarly concentrated, with the largest 5% of trades accounting for around 30% of total transaction value and the top-5 counterparties accounting for more than two-thirds of that value.

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<sup>30</sup> See Bank of England [webpage](#) for further details.

<sup>31</sup> Non-banks are not reporting transactions into SMMD.

**Table 6: Descriptive statistics of SMMD gilt repo transactions data in DFC**

Statistic	Percentile of statistic across key gilt repo dealers					
	Pre-DFC daily average			Peak trading day during DFC		
	25	50	75	25	50	75
Number of trades	153	206	230	143	191	291
Total value of trades (£ bn)	6.0	10.2	13.8	5.9	11.4	15.1
Mean trade size (£ mn)	44.1	49.5	55.4	44.4	52.1	65.4
Mean stock of repo (£bn)	9.3	17.0	24.3	7.5	20.3	29.2
Mean stock of reverse repo (£bn)	13.9	21.0	30.9	14.1	22.9	33.0
Share of trade value of largest 5% of trades (%)	24.0	27.3	30.9	24.1	28.3	34.2
Share of trade value of top-5 counterparties (%)	62.8	70.9	77.1	85.7	93.0	98.8

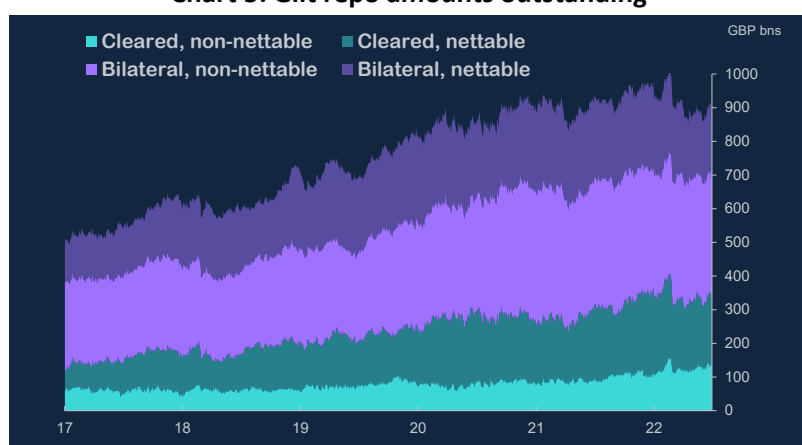
Sources: Bank of England SMMD data and Bank calculations.

### 4.3 Results

As can be seen in **Chart 5**, in 2021 - 2022 H1 approximately half of the stock of outstanding gilt repo is estimated to be nettable (dark shaded areas on Chart 5), an increase of around 10 percentage points since early 2017. This can be split into bilaterally cleared and centrally cleared. The interdealer segment is almost entirely centrally cleared and has grown over time: around 35% of total outstanding gilt repo in 2021-2022H1 was centrally cleared (total blue area), an increase of around 10 percentage points since 2017. Of the transactions that were centrally cleared during 2021 - 2022 H1, we estimate that on average roughly 70% were nettable, the share of blue segments (or 20% of the total market). Bilaterally nettable repo has also grown: around 40% of bilateral repo in 2021 - 2022 H1 is estimated to be nettable, the share of purple segments (or 25% of the total market).

The share of nettable repo varies a lot across individual key gilt repo dealers. The proportion of their gilt repo stock that is estimated to be nettable ranged from 31% to 83% during normal time average 2021 - 2022 H1. This range widened during the DFC to 23% to 90%.

**Chart 5: Gilt repo amounts outstanding**



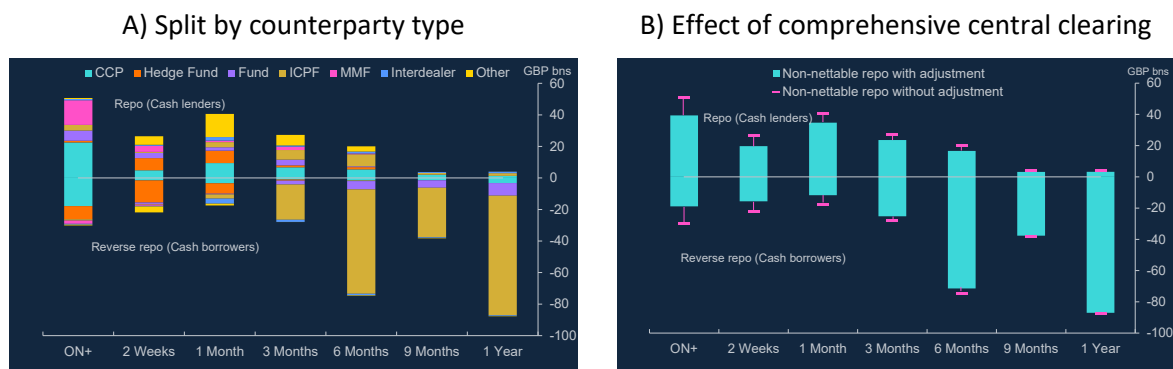
Sources: Bank of England SMMD data and Bank calculations.

Since around half of outstanding gilt repo is non-nettable, there are opportunities for greater netting of gilt repo transactions, including through expanded central clearing. This could free up dealers' balance sheet capacity further, which could be used to facilitate additional market intermediation activity. **Chart 6A** estimates how much of the gilt repo market is currently non-nettable, split by



maturity bucket.<sup>32</sup> **Chart 6B** compares how much of the market is non-nettable before and after a transition to the hypothetical state of comprehensive central clearing (as defined at the start of this paper). The largest benefit from comprehensive central clearing – represented by the size of the gap between the blue bars and purple lines – is found at shorter maturities (i.e. up to 1 month), where MMFs, hedge funds and some other investors (e.g. sovereign wealth funds and non-financials) are active. In contrast, there are few netting opportunities in longer-dated repo: pension funds and LDI funds tend to borrow cash at term, but there are few non-dealers lending cash at term to offset those trades.

**Chart 6: Outstanding amounts of non-nettable gilt repo and reverse repo by maturity<sup>(a)</sup>**



Sources: Bank of England SMMD data and Bank calculations.  
(a) Estimated amounts as of 2021Q1.

#### 4.3.1 Comprehensive central clearing

In what follows we assess the impact that comprehensive central clearing would have on the proportion of nettable repo at the market-wide level, and subsequently on dealers' balance sheet exposures and leverage ratios around the DFC period. Comprehensive central clearing could provide greater netting opportunities, since it would ensure that the counterparty would be the same for all transactions, and, therefore, the first nettable condition (see page 20) would hold by default.

**Table 7** compares the nettable stock of gilt repo during the DFC (and the immediate run-up to the DFC) under current clearing arrangements with that under comprehensive central clearing. Compared to the status quo, comprehensive central clearing could have increased the stock of nettable gilt repo by £75 billion gilt repo on an average trading day before the DFC, or by 17%. Such an increase is equivalent to 9% of all outstanding gilt repo. This estimated increase in nettable repo from comprehensive central clearing rises to £81 billion during the DFC, when repo volumes and stocks were higher. Although it is not possible to determine how dealers would respond to this additional expansion in nettable repo, in principle, greater clearing could have had a material impact on dealer intermediation capacity.

<sup>32</sup> Presenting the stock of non-nettable repo in this format requires an additional criteria that netting can only be within the same maturity bucket. In reality, there will be some netting between different maturities.

**Table 7: Nettable stock of gilt repo in the DFC under different clearing arrangements**

Nettable stock	UK gilt repo (£ billions)	
	<i>Pre-crisis</i> 2 Jan to 25 Feb	<i>DfC</i> 9 to 18 Mar
(A) Current clearing arrangements	453	472
(B) Comprehensive central clearing	528	553
Change in nettable stock: central clearing vs. current clearing (%)	75 (17%)	81 (17%)

Sources: Bank of England SMMD data and Bank calculations.

In addition to market-wide estimates, we quantify the potential impact on market participants within individual sectors of fully clearing their transactions. To estimate this, we use the same methodology used to determine the difference between the status quo and comprehensive central clearing, but instead of assuming that all transactions are cleared, we assume that only those involving counterparties from a particular sector move to the CCP. We find that comprehensive central clearing of hedge fund trades and trades with other dealers (in addition to those already cleared) would have the greatest benefits and increase the stock of nettable repo by approximately £17 billion each. This is due to those sectors being active in both repo lending and borrowing and at comparable maturities. For other sectors, such as MMFs or LDI and pension funds, which are active predominantly as cash lenders or cash borrowers, the move to central clearing has only a limited impact.

We also estimate the impact of the move to full central clearing on dealers' individual exposures and the consequent impact on their leverage ratios. The subsequent analysis focuses on a smaller subset of dealers. We use a subsample of dealers that we had access to the relevant regulatory information for. These dealers accounted for around 67% of the total stock of repo during normal time average 2021 - 2022 H1, increasing to 75% during the DFC.

The leverage ratio is defined as the capital measure (Tier 1 capital) divided by the leverage exposure measure (LEM)<sup>33</sup>. Figure 4 illustrated the impact of gilt repo transactions on dealer balance sheets, where repo transactions cause an expansion in dealer balance sheets and an increase in the LEM. Given nettable transactions do not contribute to increases in the LEM, the analysis will focus on the balance sheet intensive non-nettable gilt repo transactions.

To calculate the leverage ratio impact from comprehensive central clearing we first compute the LEM of the individual dealers with any gilt repo exposures removed. This gives us a base to compare the actual expansion of balance-sheet intensive non-nettable gilt repo (the status quo) to the counterfactual estimates for comprehensive central clearing, which we do for both pre-stress ( $x$ ) and DFC ( $y$ ) periods. More specifically, we compute the stock of non-nettable gilt repo ( $NNR$ ) as of end-2019 and remove this from dealer LEMs as of the same date. This gives 'repo-neutral' adjusted LEMs. We then calculate new LEMs by adding either the actual amount of non-nettable repo stock (as in equation 12) or the hypothetical amount should all repo be cleared (as in equation 13). We do this for both the pre-stress and DFC periods, i.e.  $t = \{x, y\}$ :

<sup>33</sup> See BCBS (2014).

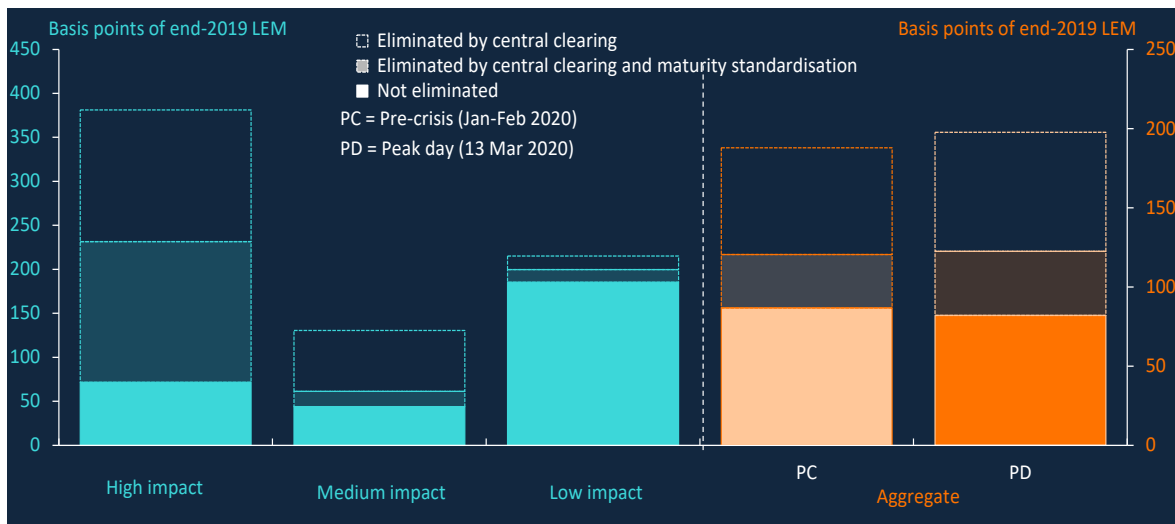
$$LEM_t = (LEM_0 - NNR_0) + NNR_t \quad (12)$$

$$LEM_t^{CCP} = (LEM_0 - NNR_0) + NNR_t^{CCP} \quad (13)$$

Leverage ratios are then calculated by dividing tier-1 capital by the LEMs.

**Chart 7** shows how comprehensive central clearing could reduce the balance sheet impact of non-nettable gilt repo relative to dealers' total exposures. During an average trading day before the DFC crisis, non-nettable gilt repo accounted for 190 basis points of total exposures based on an aggregated balance sheet of key gilt repo dealers. This increased slightly to 200 basis points during the crisis (total heights of orange bars). Central clearing could have reduced this impact by 70 basis points on an average pre-crisis trading day or by 75 basis points during the DFC, a reduction of 37-38% (heights of the top parts of orange bars).

**Chart 7: Effect of non-nettable gilt repo exposures on dealer LEMs<sup>(a)</sup>**

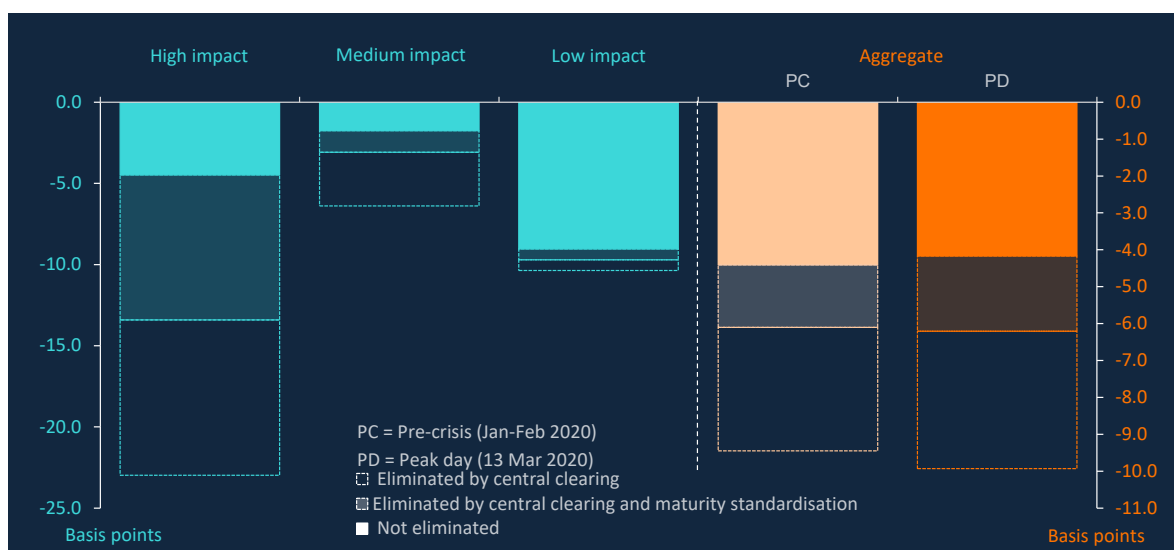


Sources: Bank of England SMMD data, regulatory bank filings and Bank calculations.

a) Low impact refers to the dealers where the introduction of comprehensive clearing and maturity standardisation on dealer LEMs is below the bottom third of the distribution, medium impact refers to dealers in the middle third and high impact refers to those dealers in the top third.

Similarly, Chart 8 shows the leverage ratio impact of non-nettable gilt repo, and how this could be reduced by greater central clearing. We find that in aggregate the impact of gilt repo books on dealers leverage ratios is around 9-10 basis points (total heights of orange bars). Compared to the status quo, during the DFC, the move to comprehensive central clearing by itself could have reduced the balance sheet impact of gilt repo by 3.8 basis points (or 40%) in aggregate. This compares to a 3.3 basis points reduction (or 35%) in leverage ratio impact of gilt repo if the comprehensive central clearing was introduced pre-DFC. But it is important to note that the balance sheet benefit of comprehensive central clearing varies substantially across dealers: for dealers where greater central clearing would have a high impact on reducing dealer leverage ratios, central clearing would have reduced the impact on the leverage ratio by 10 basis points relative to the status quo impact of 23 basis points, whereas for low impact dealers the status quo impact was 10 basis points and there was almost no change after the experiment.

**Chart 8: Effect of non-nettable gilt repo exposures on dealer leverage ratios<sup>(a)</sup>**



Sources: Bank of England SMMD data, regulatory bank filings and Bank calculations.

a) Low impact refers to the dealers where the introduction of comprehensive clearing and maturity standardisation on dealer leverage ratios is below the bottom third of the distribution, medium impact refers to dealers in the middle third and high impact refers to those dealers in the top third.

#### 4.3.2 Standardisation of repo and reverse repo maturity dates

The second nettability condition – offsetting transactions must have the same maturity date – means that some standardisation of repo and reverse repo maturity dates could increase netting and further free up balance sheet capacity. To estimate the potential impact of moderate maturity standardisation, we run an experiment where we assume that repo transactions that currently mature within the same week actually mature on the same day. Given the importance of the overnight market for providing short-term liquidity, the maturity dates for these transactions are not adjusted but the trades are still included when calculating the total nettable stock. Such standardisation should facilitate further netting opportunities, notably at shorter maturities, as indicated by **Chart 6** (left panel).

Thus, we estimate that pre-DFC, an additional £116 billion, or 14% of outstanding gilt repo, would have been nettable if comprehensive central clearing was introduced *along with* moderate standardisation of maturity dates. This increases to an additional £122 billion during the DFC stress. Therefore maturity standardisation would have increased the stock of nettable repo by approximately £40 billion (equivalent to 4% of outstanding repo) in both periods relative to the comprehensive clearing estimates without maturity standardisation in Section 4.3.1.

And as shown in **Chart 8**, moderate standardisation of maturity dates could have reduced the impact of gilt repo on dealers' leverage ratios in aggregate by another 2.0 basis points for DFC and by 1.7 basis points pre-DFC (as shown by the middle part of the orange bars), raising the total to 5.8 basis points for DFC and to 5.0 basis points pre-DFC (for a c. 60% reduction in the impact). Similar to the clearing experiment, the impact varies a lot across dealers, with certain dealers benefitting much more from the maturity standardisation than other dealers. For high impact dealers, the leverage ratio relief was almost another 10 basis points on average.

Varying impacts of both clearing and maturity standardisation experiments across dealers can be explained by their business models and the associated structure of their repo books. Generally, dealers whose repo books are more matched in terms of repo and reverse repo positions being of similar sizes and maturities (which is more often the case for shorter maturities) enjoy larger netting benefits, as opposed to those who may be funding repo lending via other sources (e.g. unsecured borrowing) or who are more active in longer-term repo lending, such as that demanded by pension or LDI funds.

The overall impact also depends on how dealers decide their internal capital allocation. In the context of dealers' broader balance sheets, the basis point reduction in the leverage ratio impact of up to 5.8 basis points from the move to central clearing and maturity standardisation may appear small in absolute terms and relative to the leverage ratio headroom that dealers may have. For instance, on average dealers had around 190 basis points of total leverage ratio buffer relative to required minimum prior to the DFC crisis.<sup>34</sup> Although the leverage ratio only applies at the group or entity level, market and supervisory intelligence suggests that dealers voluntarily choose to manage their leverage ratio at the business unit or desk level<sup>35</sup>. Therefore, although the 5.8 basis points seem relatively small compared to total buffers, this extra capacity could be material in the context of the balance sheet capacity of the repo desk.

As a result, the introduction of greater central clearing and maturity standardisation could have a material positive impact on dealers' intermediation capacity. However, there is a question as to whether that capacity would remain available for future times of stress. It is possible that dealers may respond to such one-off gains in balance-sheet capacity by expanding their activities, such that they leave no more spare capacity for times of stress than before the introduction of the policies. It is also possible that over time dealers reallocate the additional balance-sheet capacity to another part of their business, meaning there is no more additional capacity allocated to the repo business in times of stress. On the other hand, if the leverage ratio does not constrain dealer-bank activities in normal times, but rather these are managed to the risk-weighted capital ratio or internal risk metrics, then the gains in leverage-ratio headroom from the policies should be retained. Hence, they would be available to help facilitate an expansion of repo activity should it be needed, e.g. in times of stress.

Even in the first case, in which a response by dealers undoes the *initial* benefit of the policies, there would still be an *ongoing* benefit in that any expansion in repo activity would have a smaller impact on the leverage ratio to the extent that more of those new trades could be netted. For instance, during the DFC the stock of nettable and non-nettable repo of the dealers in the sample both expanded by around 10%, reducing their aggregate leverage ratio by 0.5 basis points. Had comprehensive central clearing been in place, however, instead of the dealer leverage ratio being pulled down by 0.5 basis points due to increased activity during DFC, it would have been 0.2 basis points higher.<sup>36</sup> That said, this 0.7 basis points difference in leverage ratios before and during the DFC is somewhat less than the 5.8 basis point one-off reduction in leverage-ratio impact from the introduction of the policies.

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<sup>34</sup> Section 3.3.2 reported an average headroom of 65 basis points for the six GEMMs using trade-date accounting under IFRS, whereas the average headroom across all eleven GEMMS in the sample was 190 basis points.

<sup>35</sup> Details can be found in the [2018 Q2 quarterly bulletin](#)

<sup>36</sup> The leverage ratio would have *increased* because some of the new trades conducted during the DFC would have netted with previously established ones.

## Section 5: Further considerations regarding the potential benefits and costs of central clearing

This section attempts to outline the key factors that would need to be considered to fully assess the net benefits of more-comprehensive clearing in gilt and gilt repo markets. However, it does not quantify those factors nor discuss in full how they may vary across clearing models. Hence, it does not arrive at an assessment of where the overall balance lies. We leave that for further work.

In considering the various costs and benefits of more-comprehensive central clearing, it is important to recognise their impact on the financial system as a whole. Such a comprehensive approach is important as changes in one part of the system can shift risks elsewhere. For example, other things equal, greater levels of central clearing increases the systemic importance of CCPs and may increase certain risks to their resilience, given they would face more counterparties and have greater exposures to manage.

In terms of the potential for greater central clearing to enhance resilience in gilt markets, key questions are: (i) what is the full set of benefits from such reforms and how material are those benefits; (ii) do they give rise to unintended costs or risks in other parts of the system (e.g. in terms of reduced CCP resilience); and (iii) if so, can they be managed in such a way that the benefits are preserved and the net impact on resilience of the system as a whole remains positive? It is important to note that the net benefits may depend on implementation details, notably including the type of clearing model used by market participants who are not current direct clearing members (see **Section 2.2**). Factors such as the eligibility of firms, impact on dealers' capital requirements, and clearing costs (including IM, VM, default fund, agent fees) for members and clients may vary across clearing models, and ultimately this could impact the viability of greater levels of central clearing.

### 5.1 Broader potential benefits of greater central clearing in gilt and gilt repo markets

**Enhanced dealer intermediation capacity.** As discussed in **Section 4**, there is some evidence that greater central clearing of gilt repo (especially alongside some standardisation of repo and reverse repo maturity dates) could help to alleviate dealers' balance sheet constraints and their ability to intermediate markets.

**Reduction of GSO and settlement fails, supporting market efficiency and participants' confidence in the market.** Expansion of central clearing could materially reduce the GSOs for participants in cash gilt markets, where the balance-sheet benefits are less prevalent. As outlined in **Section 3**, we estimate central clearing could reduce dealers' GSOs in the gilt market by 48% an average trading day, and 53% on a peak trading day. This could help to reduce settlement fails, which should help to build confidence in the market and may reduce capital charges for dealers associated with potential trade failures. In addition, settlement through CCPs is arguably more operationally efficient than bilateral settlement and it protects against 'daisy chains' of failed settlements.<sup>37</sup> During the Covid stress, the proportion of trades failing to settle in gilt and gilt repo markets rose from c. 2% in January-February 2020 to peak rates of 6-7% in March. This largely reflected operational issues associated with the shift to remote

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<sup>37</sup> For example, Duffie (2021) presents evidence that UST settlement fails rose less in March 2020 for trades that were centrally cleared than for all trades involving primary dealers.

working. Importantly, market intelligence suggests that settlement fails rose by less in the cleared space, where rates peaked at around 2%.

**Reduction in counterparty credit risk for market participants.** Credit protection, in the form of IM, VM and default fund contributions (see **Section 2**), provided by the various clearing models likely reduces the counterparty credit risk for market participants, as well the contagion risk to the broader market should a counterparty active in the gilt/gilt repo market default, compared to bilateral clearing. This is more so a benefit in the gilt repo market, since for cash gilts counterparty risk is minimal due to Delivery versus Payment (DvP)<sup>38</sup> settlement. In addition, central clearing reduces the risk barriers for non-dealers to trade with various other market participants (e.g. hedge funds and MMFs) via the CCP.

**Standardised and potentially more robust risk management standards and contract terms.** Central clearing incentivises standardisation of contract terms, such as those covering collateral haircuts, which if calibrated appropriately, can help limit the build-up of leverage and risk in the system. This is also beneficial for operational efficiency reasons.

**Diversifying buy-side routes to markets, including via “all-to-all” trading.** The enhanced credit protection, reduced settlement risk and contract standardisation facilitated by central clearing have the potential to incentivise a larger number of market counterparties to trade directly with each other, thereby reducing the reliance on dealer-banks for liquidity provision. Market intelligence indicates that this benefit is perceived as particularly valuable during times of balance sheet shortages, due to market stress or seasonal reporting periods. All-to-all trading is a term used to describe a range of trading protocols that, in their purest form, would enable any market participant to trade directly with any other market participant. This does not necessarily eliminate participation of traditional intermediaries, but rather increases the potential for market participants to source liquidity from a broader range of providers (including non-banks). Care would be needed to ensure that any change in the make-up of liquidity providers did not increase the risk of a jump to illiquidity in times of market stress.

## *5.2 Potential risks and challenges of greater central clearing in gilt and gilt repo markets*

Greater central clearing of cash gilts and gilt repo would increase the systemic importance of CCPs in these markets and could give rise to a number of risks and challenges:

**Potential for other constraints on dealer intermediation capacity.** Despite the netting benefits to dealer balance sheets outlined in **Section 4**, there are other constraints, such as internal risk limits (e.g. Value-at-Risk), which may also limit expansion of dealers’ intermediation services. There is also no guarantee that these balance sheet savings would be retained by dealers’ repo desks.

**Risks for CCPs.** Assuming the uptake of derivatives-style client clearing services remains limited, any significant expansion of clearing in gilt and gilt repo markets would need to occur through the expansion of a CCP’s membership structure, for example via direct or sponsored membership (see

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<sup>38</sup> With DvP, the security (i.e. a gilt) is only delivered to the buyer only once cash is received by the seller. Cash payment is either simultaneous or prior to delivery.

**Section 2.2).** Prospective direct or sponsored members from the non-banking community present a different counterparty credit risk profile to CCPs as compared to banks. In addition, standardisation of repo maturity dates, which would help increase balance sheet netting for dealers, would increase liquidity risks for CCPs, notably by bunching VM payments on particular days. Given the systemic nature of the CCPs, regulators would need to ensure that such risks were adequately managed. Finally, any large increase in membership size would also place increased operational demands on CCPs.

**Margin requirements.** By bringing a large quantity of new participants into clearing, a significant proportion of the market would become subject to CCP margin rules. Any event that necessitated an increase in CCP margin requirements or collateral haircuts would create additional liquidity demand in the system, with potential financial stability implications if that demand could not be easily met. Moreover, VM must be paid in cash in centrally cleared markets, whereas current practice in bilateral markets also allows for selected high-quality securities to be used. These risks should be assessed and adequately mitigated, including via market participant preparedness for such margin calls, before any material expansion of clearing. Indeed, international policy work to address the reactivity of margin models and predictability, transparency and preparedness of market participants for margin calls was underway at the time of writing.<sup>39</sup>

**Concentration risk.** Where forms of sponsored clearing are used to provide access to new participants, consideration should also be given to the level of concentration of activity amongst sponsoring agent banks. While an increase in the number of banks eligible (or willing) to offer firms access to clearing through a sponsored clearing structure might be expected if sponsored clearing volumes increased, it is possible that only a small number of banks may continue to offer such services or otherwise account for a disproportionately large volume of activity. Should one of a small cohort of sponsoring banks experience a major default event, a large number of gilt market participants may, at least temporarily, be unable to continue transacting in the market.

**Impact on dealer banks and their business models.** CCPs impose eligibility criteria to determine the entities to which they offer clearing services. CCPs who offer clearing services to highly leveraged investors often require sponsoring banks (dealers) to provide a form of guarantee for their client's activity. For example, they may be responsible for completing settlement of their client's trades where the latter has defaulted on its obligations to the CCP. The provision of such guarantees would pose additional risks to "sponsoring" dealers, which would likely need to be mitigated (e.g. via capital requirements). This, in turn, may reduce the balance sheet savings achieved through greater netting. In addition, greater all-to-all trading may reduce the value of dealer franchises, potentially causing them to reduce their balance sheet allocations to trading or even exit the business altogether. This would limit their ability to absorb the flow imbalances, including during times of stress.

**Other challenges associated with adoption of greater central clearing in gilt and gilt repo markets.** Aside from the benefits and risks that more-widespread central clearing may bring, there would be certain challenges associated with the adoption of such reforms. For instance, there participants would face initial set-up costs, e.g. to establish adequate operational processes and systems required for participation. In addition, ongoing clearing costs may be higher than for bilateral clearing, at least

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<sup>39</sup> See page 82 of Bank of England (2022).



in normal times, potentially discouraging participation altogether. This is due to the need to post margin and default fund contributions and because of comparatively higher collateral haircuts. In times of stress, however, market participants have struggled to access bilaterally cleared markets. Indeed, Bank of England market intelligence identified an increase in non-bank interest in central clearing following the Covid-related financial stress of March 2020. However, a challenge for some non-bank sectors is that regulatory requirements may limit their participation in central clearing. For example, European MMF regulations limit the exposure that funds can have to a single counterparty (including CCPs) to 15% of their assets. As sterling MMFs often invest c. 15-20% of their portfolios in repo, this may limit the extent to which they are able to centrally clear their trades. There is a similar limit in the US, albeit a little higher at 25%.

## 6: Conclusion

Policy interest in central clearing of government-bond security and repo transactions has grown in recent years following a number of instances in which core financial markets became dysfunctional as bank-affiliated securities dealers appeared to become constrained in their ability to intermediate these and other markets. More-widespread central clearing could help by increasing the scope for netting of assets and liabilities related to unsettled trades, which could reduce the impact of those trades on dealers' balance sheets and capital requirements. But to what extent? We shed light on this question by studying the cash gilt and gilt repo trades of UK dealers around the DFC crisis.

If comprehensive central clearing had been introduced in the gilt repo market ahead of the DFC crisis, we estimate that the aggregate balance-sheet exposures of UK dealers related to their gilt repo trades (as recorded by their LEMs) would have fallen from 190 to 120 basis points of total LEM, a reduction of 37%. If repo maturity dates had additionally been standardised such that they fell on a common day of the week (apart from for overnight repo), those exposures would have fallen to 90 basis points of total LEM, a reduction of 53%.

Such a reduction in exposures would have boosted the leverage ratio of UK dealers in aggregate by 5.0 basis points. That is a relatively small amount compared with the 190 basis points of capital headroom over the regulatory requirement that they already held ahead of the DFC crisis. However, dealers must choose how to allocate their total capital to their various business activities. If UK dealers had allocated one-twentieth of their total capital to their repo trading desks, for instance, those desks would have held capital worth 24.5 basis points of bank-wide LEM on average: 15 basis points for their share of the minimum requirement and 9.5 basis points of headroom. Compared with the latter, an additional 5.0 basis points is more material. Moreover, that is an aggregate figure. For the one-third of UK dealers that would have enjoyed the largest netting benefits from comprehensive central clearing and maturity standardisation of gilt repo trades, those policies would have boosted capital headroom by 18 basis points of bank-wide LEM on average.

It is possible, however, that dealers may respond to such increases in capacity in non-stress times by expanding their repo activity or choosing to reallocate capital internally and expand their other activities. Either way, it would mean that less of the new capacity would remain for stress times. Even if that were the case, however, the enhanced netting benefits of comprehensive central clearing and maturity standardisation would still reduce the impact on leverage ratio exposures and capital requirements of any surges in trading in stress times. A reduction in incremental exposures due to enhanced netting of 60%, for instance, would mean dealers could expand their trading by 2.5 times as much for each unit of capital headroom available.

In cash markets, greater central clearing would no longer have any effect on dealers' LEMs or leverage ratios. This is because the treatment of such trades in the Basel III leverage ratio has been harmonised across accounting standards since the beginning of 2023 to allow netting of receivables and payables *regardless of counterparty*, which is equivalent to holding those exposures with a single (CCP) counterparty. Our results on the netting benefits of comprehensive central clearing at the time of the DFC crisis may therefore be most helpfully viewed as an illustration of the effects that the Basel III changes will bring in any future crises. For the UK dealers that only netted payables and receivables with the same counterparty before the DFC crisis, we estimate that comprehensive central clearing would have cut their aggregate exposures related to unsettled cash gilt trades from 17 to 4 basis points

of total LEM, a reduction of 80%. This exposure reduction would have boosted their leverage ratios by 0.4 basis points on average. Moreover, the increase in their aggregate exposures related to unsettled gilt trades as trading surged during the DFC would have been reduced by 60%.

Greater central clearing in cash markets could still reduce dealers' settlement obligations and, hence, settlement risk and capital requirements. For UK dealers, we estimate that comprehensive central clearing would have cut cash gilt settlement obligations by around 50% both prior to the DFC and during it, when settlement obligations surged. However, the impact of cash gilt settlement risk on capital requirements is small due to the one-day settlement of trades in this market and the delivery-versus-payment settlement protocol. So, reductions in cash gilt settlement obligations seem unlikely to materially boost UK dealers' intermediation capacity.

The netting benefits of greater central clearing on the balance sheets of dealers and, thus, their ability to continue to intermediate financial markets in times of stress is only one consequence of such a policy. Further potential benefits include a reduction in settlement failures as well as substituting trading counterparties for CCPs, which may reduce counterparty risk. The latter may, in turn, promote growth of all-to-all trading, which could make intermediation less reliant on dealer balance sheets by facilitating trades between non-dealers. However, potential costs include greater credit risk for CCPs and their clearing members to manage, as well as possible liquidity strains, which may arise from CCP margin calls.

Where the netting benefits of greater central clearing appear material, such as for gilt repo trades, further consideration of these remaining costs and benefits should be given to determine whether the policy would be net beneficial for the UK financial system overall. If so, the policy could contribute to the strand of the reform agenda on boosting the responsiveness of liquidity supply in times of stress. In addition, ongoing international policy work to reduce surges in liquidity demand and design central bank backstops for severe stresses remains critical.<sup>40</sup>

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<sup>40</sup> See Section 4 of Bank of England (2021) for further details on these policy workstreams.

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